

# Areas of Parallelograms and Triangles



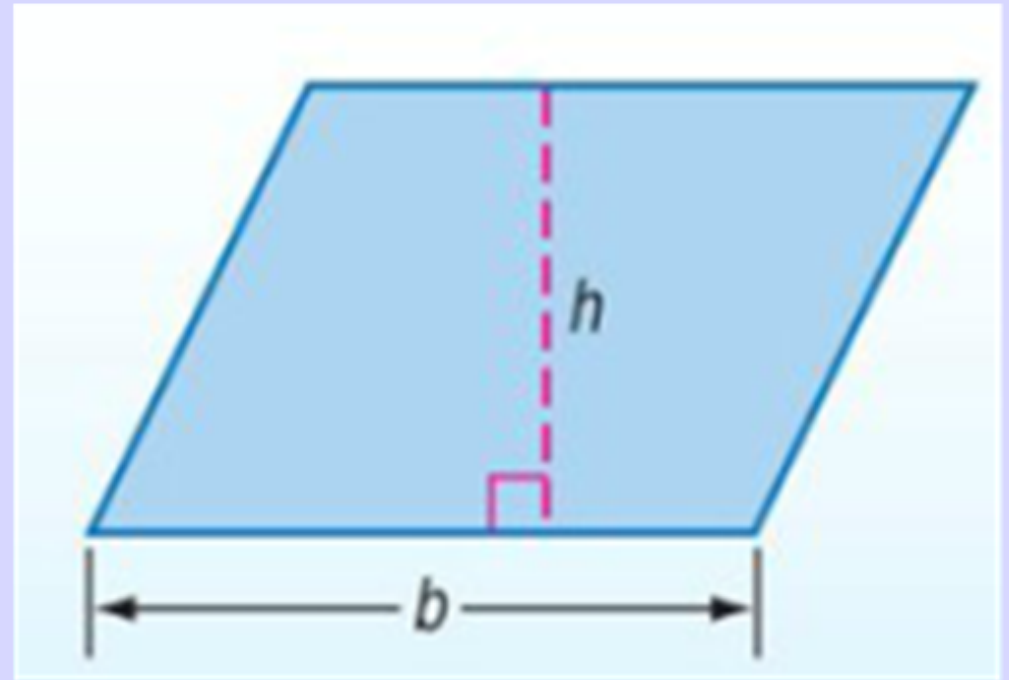
You will be able to find the area and perimeter of a parallelogram and a triangle.

# Area of Parallelogram

$$A = bh$$

↓  
Base  
(any side)

↘ height  
distance from  
one side to  
other



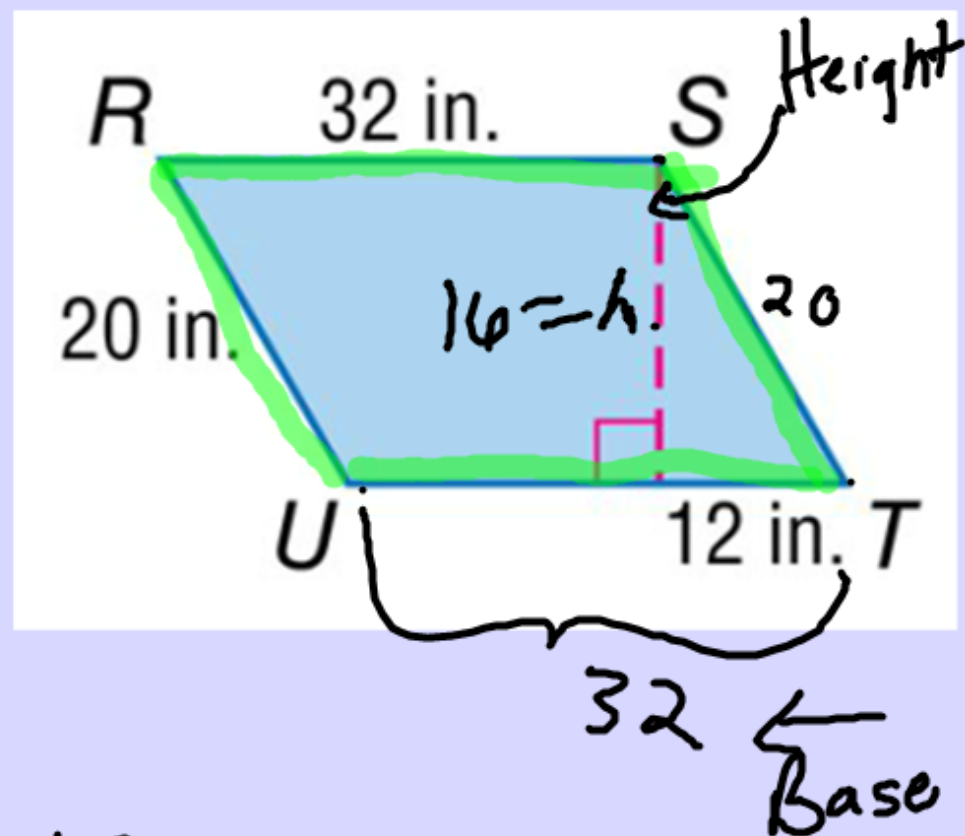
Find the area and perimeter

$$P = 20 + 32 + 20 + 32 = 104 \text{ in}$$

$$A = bh$$

$$A = 32(16)$$

$$A = 512 \text{ in}^2$$



$$h^2 + 12^2 = 20^2$$

$$\begin{array}{r} h^2 + 144 = 400 \\ -144 \quad -144 \\ \hline \end{array}$$

$$h^2 = 256$$

$$h = \sqrt{256} = 16$$

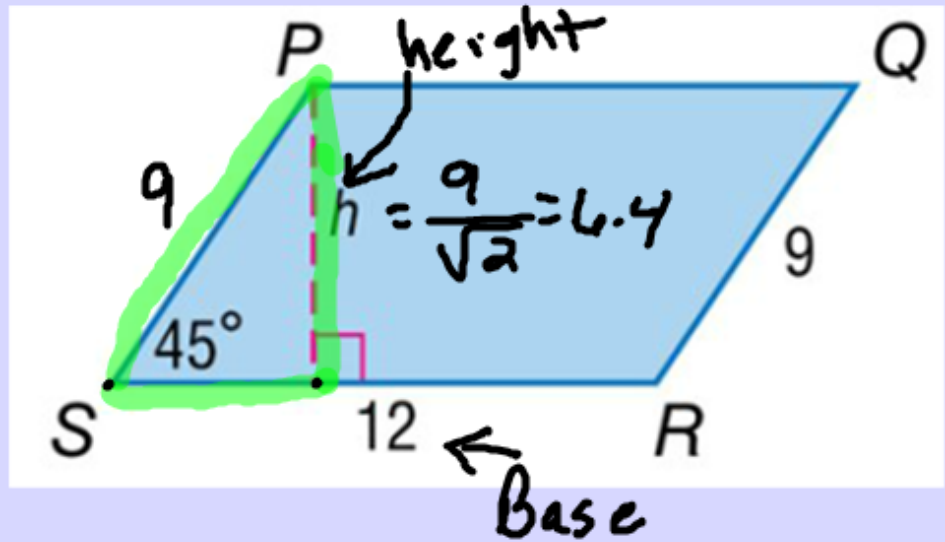
Find the area and perimeter

$$P = 12 + 9 + 12 + 9 = 42$$

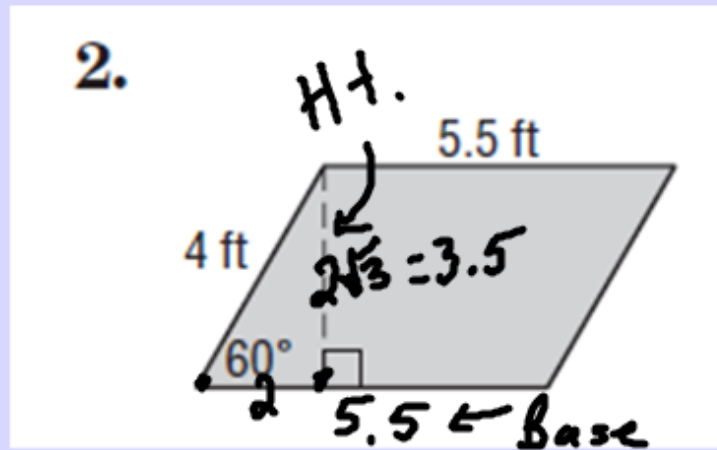
$$A = bh$$

$$A = (12)(6.4)$$

$$A = 76.8$$



Find the area and perimeter of each parallelogram

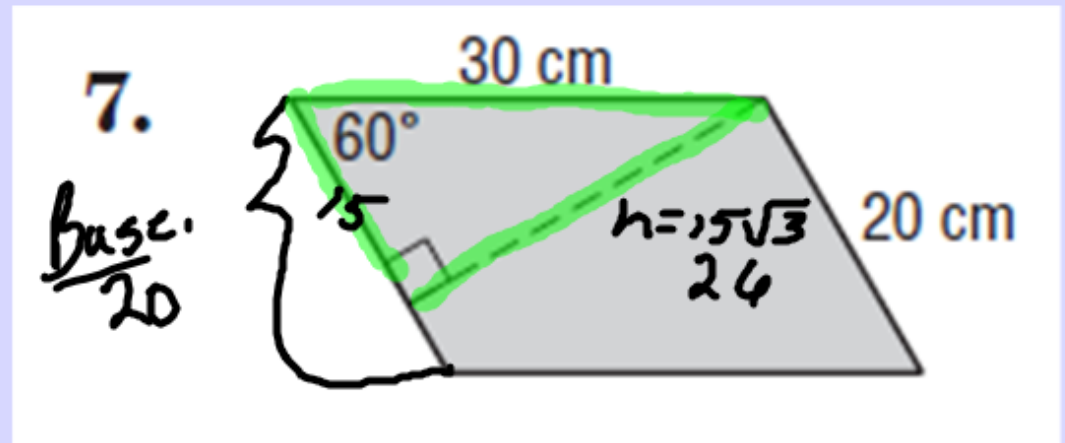


$$P = 4 + 5.5 + 4 + 5.5 = 19 \text{ ft}$$

or

$$(4 + 5.5) \cdot 2 = 19 \text{ ft}$$

$$A = (5.5)(3.5) = 19.3 \text{ ft}^2$$



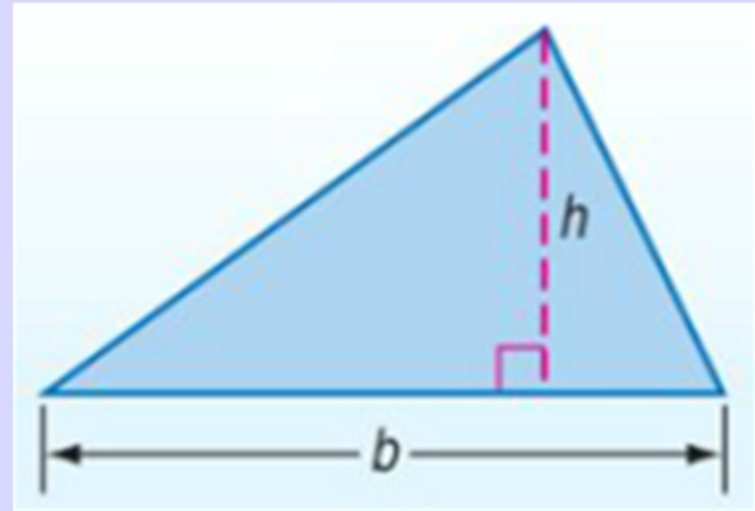
$$P = 30 + 20 + 30 + 20 = 100 \text{ cm}$$

$$A = bh$$

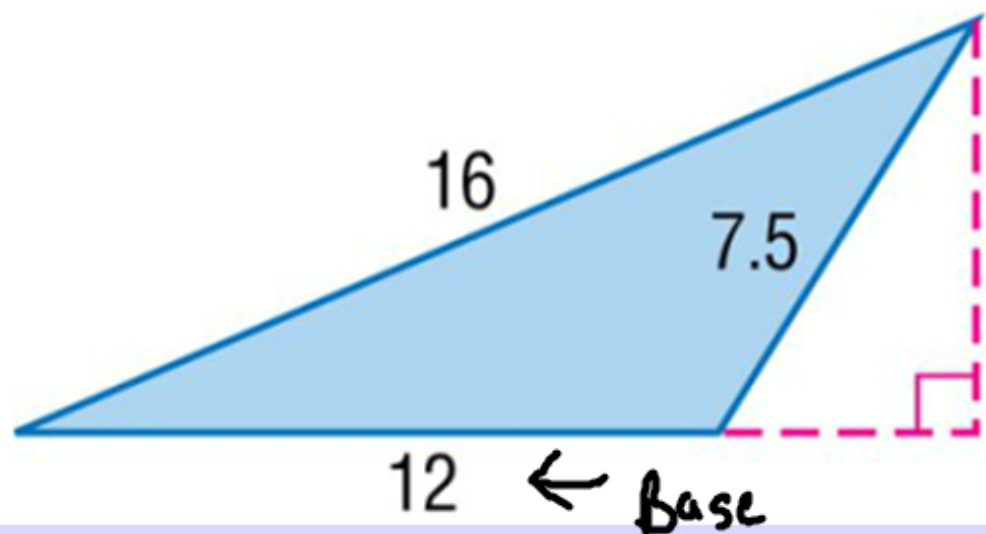
$$A = 20(24) = 520 \text{ cm}^2$$

# Area of Triangle

$$A = \frac{1}{2}bh \quad \text{or} \quad \frac{bh}{2}$$



**SANDBOX** You need to buy enough boards to make the frame of the triangular sandbox shown and enough sand to fill it. If one board is 3 feet long and one bag of sand fills 9 square feet of the sandbox, how many boards and bags do you need to buy?



$$P = 16 + 12 + 7.5 = 35.5$$

$$\text{Boards} \rightarrow \frac{35.5}{3} = 11.8 \rightarrow 12 \text{ Boards}$$

$$A = \frac{1}{2} (12)(9) = 54$$

$$\text{Bags} \rightarrow \frac{54}{9} = 6 \text{ Bags}$$

9. The height of a parallelogram is 10 feet more than its base. If the area of the parallelogram is 1200 square feet, find its base and height.

$$h = b + 10$$

$$A = bh$$

$$1200 = b(b+10)$$

$$1200 = b^2 + 10b$$

$$0 = b^2 + 10b - 1200$$

Use Quadratic Formula

$$\text{Base} = \frac{-10 \pm \sqrt{10^2 - 4(1)(-1200)}}{2(1)}$$

$$\frac{-10 \pm \sqrt{100 + 4800}}{2}$$

$$\frac{-10 \pm \sqrt{4900}}{2}$$

$$\frac{-10 \pm 70}{2}$$

$$\frac{-10+70}{2}, \frac{-10-70}{2}$$

$$30 \text{ or } -40$$

↑  
can't  
be  
neg.

$$\text{Base} = 30$$

$$\text{Height} = 30 + 10 = 40$$



10. The base of a triangle is one half of its height. If the area of the triangle is 196 square millimeters, find its base and height.

$$b = \frac{1}{2}h$$

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \left( \frac{1}{2}h \right) h$$

$$4 \cdot 196 = \frac{1}{4}h^2 \cdot 4$$

$$784 = h^2$$

$$28 = h$$

$$14 = b$$